

PATENT COOPERATION TREATY**PCT****INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

| | | | |
|--|---|---|------------------|
| Applicant's or agent's file reference P2003.0487WO | FOR FURTHER ACTION | | See item 4 below |
| International application No. PCT/DE2004/001594 ✓ | International filing date (day/month/year) 22 July 2004 (22.07.2004) ✓ | Priority date (day/month/year) 31 July 2003 (31.07.2003) ✓ | |
| International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237 | | | |
| Applicant OSRAM OPTO SEMICONDUCTORS GMBH | | | |

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

| | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input checked="" type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

| |
|---|
| Date of issuance of this report 29 May 2006 (29.05.2006) |
|---|

| | |
|---|--|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 740 14 35 | Authorized officer Agnes Wittmann-Regis Telephone No. +41 22 338 89 70 |
|---|--|

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

| | | |
|---|---|---|
| | | Date of mailing (day/month/year) |
| Applicant's or agent's file reference P2003, 0487WO | | FOR FURTHER ACTION See paragraph 2 below |
| International application No. PCT/DE2004/001594 | International filing date (day/month/year) 22.07.2004 | Priority date (day/month/year) 31.07.2003 |
| International Patent Classification (IPC) or both national classification and IPC | | |
| Applicant OSRAM OPTO SEMICONDUCTORS GMBH | | |

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

| | |
|--|--------------------|
| Name and mailing address of the ISA/EP | Authorized officer |
| Faxsimile No. | Telephone No. |

Translation

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- a sequence listing
 table(s) related to the sequence listing

b. format of material

- in written format
 in computer readable form

c. time of filing/furnishing

- contained in the international application as filed.
 filed together with the international application in computer readable form.
 furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

| | |
|-----------|--|
| Box No. V | Reasoned statement under Rule 43bis I(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
|-----------|--|

1. Statement

| | | | |
|-------------------------------|--------|-------------|-----|
| Novelty (N) | Claims | <u>1-17</u> | YES |
| | Claims | <u>18</u> | NO |
| Inventive step (IS) | Claims | <u>1-17</u> | YES |
| | Claims | <u>18</u> | NO |
| Industrial applicability (IA) | Claims | <u>1-18</u> | YES |
| | Claims | | NO |

2. Citations and explanations:**I. Claims 1 to 17:**

1. The article "Selective area deposited blue GaN-InGaN multiple-quantum well light emitting diodes over silicon substrates" by J.W. Yang et al., which was published in Applied Physics Letters, Vol. 76, No. 3 (17 January 2000), pages 273-275, XP-12025677, and is referred to as D1 in the procedure hereinafter, describes (see page 273, right-hand column, 2nd paragraph, to page 274, left-hand column, 2nd paragraph, and figure 1) a method for the production of a plurality of optoelectronic semiconductor chips respectively comprising a plurality of structural elements respectively having at least one semiconductor layer, the method comprising the following method steps:

- provision of a chip composite base having a substrate (n^+ Si substrate) and also a growth surface (AlN buffer layer);
- formation of a mask material layer on the growth surface, with a plurality of windows, a mask material being chosen in such a way that a semiconductor material of the semiconductor

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

Box No. V

Reasoned statement under Rule 43bis.I(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- layer, which is grown in a later method step, cannot grow on said material or can grow in a substantially worse manner in comparison with the growth surface; and
- essentially simultaneous growth of semiconductor layers on regions of the growth surface that lie within the windows.
2. The subject-matter of claim 1 differs from this by virtue of the fact that the mask material layer grows incompletely and the windows are formed thereby, and by virtue of the fact that the chip composite base with the applied material is singulated to form semiconductor chips.
3. Although not discussed expressly in document D1, it is nevertheless readily clear to a person skilled in the art that a wafer with a plurality of semiconductor components can be singulated if individual components are needed and, by way of example, a display is not intended to be produced. Therefore, this features is to be regarded as implicitly disclosed.
4. The windows investigated in document D1 are produced by etching the mask material layer and are therefore also not statistically distributed. Another possibility for forming windows is described in the article "Selective growth of nanocrystalline Si dots using an ultrathin-Si-oxide/oxynitride mask" by N. Miyata et al., which was published in Applied Physics Letters, Vol. 77, No. 11 (11 September

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITYInternational application No.
PCT/DE2004/001594

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2000), pages 1620 to 1622, and is referred to as D2 in the procedure hereinafter (see page 1620, left-hand column, 1st paragraph, to page 1621, left-hand column, 2nd paragraph, and figure 1). In this case the windows are produced by means of a focused electron beam, but only after the mask material layer has grown in closed fashion. The document EP-A-0 472 221, which is referred to as D3 in the procedure hereinafter, also uses etching (see column 8, lines 2 to 41, and figures 8A-8F). Documents D2 and D3 are concerned, in the same way as D1, with the selective growth of semiconductor material in a window in a mask layer.

5. The available prior art does not disclose any method in which the mask layer is applied incompletely in order to obtain windows for selective growth in this way. Therefore, a person skilled in the art would be able to overcome the gap between the teaching of document D1 and the subject-matter of claim 1 only by means of an inventive effort. Claim 1 therefore appears to meet the requirements of PCT Article 33(2) and (3).
6. Claims 2 to 17 are dependent on claim 1, that is to say that they contain all the features of claim 1. Since claim 1 appears to meet the requirements of PCT Article 33(2) and (3), this is evidently the case for claims 2 to 17 as well.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

Box No. V

Reasoned statement under Rule 43bis J(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**II. Claim 18:**

1. Claim 18 only describes an optoelectronic semiconductor chip with a light-emitting component. Since the chip has been singulated, it is no longer possible to draw a conclusion about the statistical distribution of the basic area size, and irregular forms of the basic area are also to be expected in the case of the method according to document D2. The details of the production method can therefore no longer be inferred from the finished semiconductor chip. Since, in the case of etching the windows as well, there will be basic area forms as in the case of incomplete growth of the mask material layer, claim 18 does not appear to meet the requirements of PCT Article 33(2) and (3) (also see notes under Box VIII below).

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

1. Independent claim 1 has not been drafted in the two-part form defined by PCT Rule 6.3(b). However, in the present case the two-part form would appear to be appropriate. Accordingly, the features known in combination from the prior art (document D1) should be placed in the preamble (PCT Rule 6.3(b)(i)) and the remaining features in the characterizing part (PCT Rule 6.3(b)(ii)).

2. Contrary to PCT Rule 5.1(a)(ii), the description does not cite documents D1 and D2 or indicate the relevant prior art disclosed therein.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/001594

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claim 18 is directed at an object but describes it with the aid of a method for its production. Such an "product-by-process" claim can be clear within the meaning of PCT Article 6 only when the method features are unambiguously evident from the finished object. This is obviously not the case here.